1. A town has an initial population of 60000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	60000	60027	60043	60055	60064	60071	60077	60083	60087

A. Non-Linear Power

B. Logarithmic

C. Exponential

D. Linear

E. None of the above

---

2. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of $200°$ *C and is placed into a* $18°$ *C bath to cool. After 15 minutes, the uranium has cooled to* $149°$ *C.*

A. $k = -0.02821$

B. $k = -0.05239$

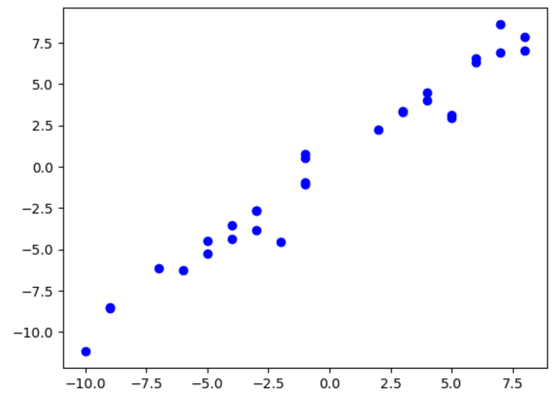
C. $k = -0.05160$

D. $k = -0.08354$

E. None of the above

---

3. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Linear model

C. Exponential model

D. Logarithmic model

E. None of the above

---

4. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

   A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 2 bacteria-α. After 2 hours, the petri dish has 133 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

   A. About 188 minutes

   B. About 263 minutes

   C. About 31 minutes

   D. About 43 minutes

   E. None of the above

---

5. A town has an initial population of 70000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	69964	69924	69884	69844	69804	69764	69724	69684	69644

A. Linear

B. Logarithmic

C. Exponential

D. Non-Linear Power

E. None of the above

---

6. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 979 grams of element X and after 5 years there is 97 grams remaining.

A. About 2190 days

B. About 730 days

C. About 365 days

D. About 1 day

E. None of the above

---

7. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's

temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 140° *C and is placed into a* 18° *C bath to cool. After 22 minutes, the uranium has cooled to* 75° *C.*

A. $k = -0.03166$

B. $k = -0.03459$

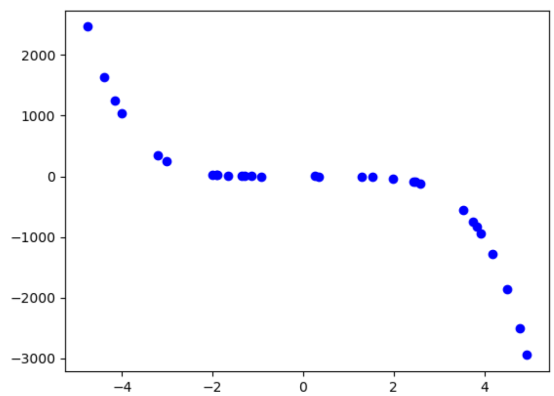
C. $k = -0.03093$

D. $k = -0.04085$

E. None of the above

---

8. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Exponential model

C. Non-linear Power model

D. Linear model

E. None of the above

---

9. Using the scenario below, model the situation using an exponential

function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 920 grams of element X and after 7 years there is 131 grams remaining.

A. About 730 days

B. About 1095 days

C. About 1 day

D. About 2920 days

E. None of the above

---

10. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 3 bacteria-α. After 3 hours, the petri dish has 889 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 47 minutes

B. About 21 minutes

C. About 284 minutes

D. About 131 minutes

E. None of the above

---

11. A town has an initial population of 100000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	100030	100060	100090	100120	100150	100180	100210	100240	100

A. Linear

B. Logarithmic

C. Non-Linear Power

D. Exponential

E. None of the above

---

12. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of $100°$ *C and is placed into a* $13°$ *C bath to cool. After 37 minutes, the uranium has cooled to* $54°$ *C.*

A. $k = -0.02410$

B. $k = -0.02815$

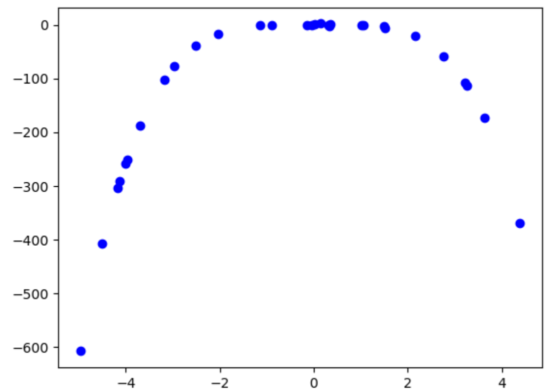
C. $k = -0.01791$

D. $k = -0.01836$

E. None of the above

---

13. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Linear model

C. Logarithmic model

D. Non-linear Power model

E. None of the above

---

14. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 4 bacteria-α. After 1 hours, the petri dish has 56 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 93 minutes

B. About 15 minutes

C. About 185 minutes

D. About 30 minutes

E. None of the above

---

15. A town has an initial population of 30000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	30018	30046	30058	30086	30098	30126	30138	30166	30178

A. Logarithmic

B. Exponential

C. Linear

D. Non-Linear Power

E. None of the above

---

16. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 828 grams of element X and after 6 years there is 92 grams remaining.

A. About 2555 days

B. About 1 day

C. About 365 days

D. About 730 days

E. None of the above

---

17. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's

temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 110° *C and is placed into a* 19° *C bath to cool. After 11 minutes, the uranium has cooled to* 43° *C.*

A. $k = -0.12116$

B. $k = -0.13840$

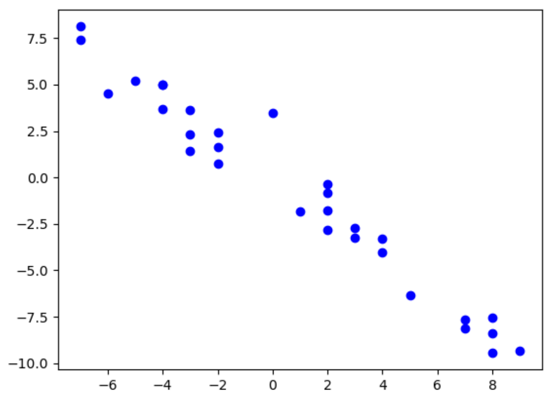
C. $k = -0.05068$

D. $k = -0.05243$

E. None of the above

---

18. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Linear model

C. Logarithmic model

D. Non-linear Power model

E. None of the above

---

19. Using the scenario below, model the situation using an exponential

function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 537 grams of element X and after 4 years there is 59 grams remaining.

A. About 365 days

B. About 1 day

C. About 1825 days

D. About 365 days

E. None of the above

---

20. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 3 bacteria-α. After 3 hours, the petri dish has 729 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 215 minutes

B. About 35 minutes

C. About 59 minutes

D. About 359 minutes

E. None of the above

---

21. A town has an initial population of 40000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	40000	40027	40043	40055	40064	40071	40077	40083	40087

A. Exponential

B. Logarithmic

C. Linear

D. Non-Linear Power

E. None of the above

---

22. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of $110°$ *C and is placed into a* $17°$ *C bath to cool. After 37 minutes, the uranium has cooled to* $68°$ *C.*

A. $k = -0.01864$

B. $k = -0.02077$

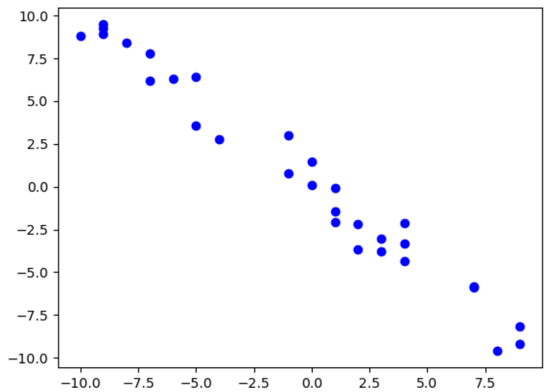
C. $k = -0.01921$

D. $k = -0.01624$

E. None of the above

---

23. Determine the appropriate model for the graph of points below.



A. Linear model

B. Exponential model

C. Logarithmic model

D. Non-linear Power model

E. None of the above

---

24. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 3 bacteria-α. After 2 hours, the petri dish has 105 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 46 minutes

B. About 140 minutes

C. About 23 minutes

D. About 276 minutes

E. None of the above

---

25. A town has an initial population of 50000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	50026	50056	50094	50124	50146	50176	50214	50244	50266

A. Non-Linear Power

B. Linear

C. Logarithmic

D. Exponential

E. None of the above

---

26. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 630 grams of element X and after 2 years there is 126 grams remaining.

A. About 730 days

B. About 365 days

C. About 1 day

D. About 0 days

E. None of the above

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27. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's

temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of $100°$ C *and is placed into a* $12°$ C *bath to cool. After 21 minutes, the uranium has cooled to* $30°$ C.

A. $k = -0.08166$

B. $k = -0.02513$

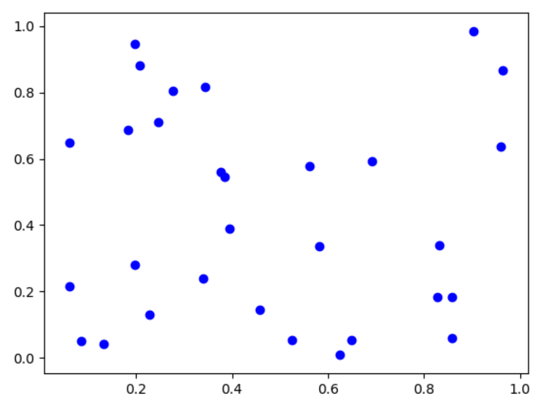
C. $k = -0.03950$

D. $k = -0.02456$

E. None of the above

---

28. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Linear model

C. Exponential model

D. Non-linear Power model

E. None of the above

---

29. Using the scenario below, model the situation using an exponential

function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 779 grams of element X and after 2 years there is 194 grams remaining.

A. About 1 day

B. About 730 days

C. About 0 days

D. About 365 days

E. None of the above

---

30. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 2 bacteria-α. After 2 hours, the petri dish has 149 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 115 minutes

B. About 19 minutes

C. About 199 minutes

D. About 33 minutes

E. None of the above
